View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by ScholarSpace at University of Hawai'i at Manoa

Exploring the Impact of Universities' Digital Advancement on Students' Perceptions – A Driver of Reputation and WoM Behavior?

Delphine Colin
Ludwig-Maximilians-Universität München
colin@bwl.lmu.de

Sarah Mahr
Ludwig-Maximilians-Universität München
mahr@bwl.lmu.de

Abstract

Universities nowadays face an increasing competition for high-potential students. As students rely on opinions of their peers when deciding for a study program, universities benefit from positive word-of-mouth (WoM). A good way to increase positive WoM is to establish a favorable reputation among their current students. Therefore, this study investigates reputational drivers with a focus on the influence of digital offers. It explores students' perceptions of universities' digital advancement and how it impacts university reputation and their WoM behavior. First, this paper introduces a measurement for students' perception of their universities' digital advancement (PDA). The results of a PLS-SEM model underline the quality of the proposed measurement. Second, this paper highlights the explanatory power of the PDA construct on students' assessment of university reputation and on their WoM behavior. Particularly, results show that the PDA construct is the third most influential driver for universities' likeability and students' related WoM behavior.

1. Motivation

Universities face a growing international competition on the educational market [1]. Whereas in 2005 11,186 different study programs were offered in Germany, today students can choose between 18,044 programs [2]. As the panel of choice of studies increases, students largely rely on recommendations of other students before applying for a specific study program [3–5]. Due to students' large participation in social media platforms, future students can easily gain access to students' comments and impressions about their university. Further, websites such as unigo.com even aggregate students' reviews, further facilitating the access to students'opinions. Thus, the question of how to get positive WoM among students is of utter relevance for universities. Research could already show that WoM behavior of students about their own university is largely driven by its reputation [6]. Building a strong reputation among current university students is thus particularly helpful to attract talented applicants. Like it is the case for firms [e.g. 7], reputation is one of the most valuable intangible assets of a university [8].

However, rather little attention has been paid to the identification of the antecedents of university reputation. Prior research highlights several drivers such as educational quality [9] or the selectivity of a university concerning the quality of its students [10]. The identification of these drivers undoubtedly constitutes a major contribution to research on university reputation. Nevertheless, recent changes in the educational market related to innovations stemming from the development of information technologies renew the need for research on that question. Indeed, the development of information technologies has brought disruptive changes to the educational world, such as the creation of virtual campuses, the development of online e-learning solutions, the diffusion of MOOCs, or the digitalization of university services with the development of platforms or mobile applications [11]. As universities around the world engaged differently in these new developments, one may wonder whether students' perceptions regarding their university's digital advancement play a role in the assessment of their universities' reputation and in their engagement in WoM behavior. As no research so far explores students' perceptions regarding their own university's technological offers, no publication explores their effects on reputation and WoM behavior. This study proposes to fill this research gap. The contribution of the present research to the literature is twofold: First, we develop a formative measurement scale for "perceived digital advancement (PDA), a construct to measure students' perceptions of their own university's digital advancement (study 1). Second, we investigate the relative importance of PDA in comparison with the classical drivers of university reputation, assessing their impact on WoM, using PLS-SEM (study 2).

URI: http://hdl.handle.net/10125/41391
ISBN: 978-0-9981331-0-2
CC-BY-NC-ND

2. Theoretical Background

Word-of-mouth is defined as "informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services or their sellers" [12] (p. 261). As information received via WoM is considered particularly credible [13], it is a major influencing factor of consumer behavior [14], e.g. in terms of purchase decisions [15]. Likewise, students as "consumers" of higher education are influenced by WoM. Particularly, the choice of a university is strongly influenced by current students' opinions [4]. But, how can universities get their students to speak positively about them? In this regard, a university's reputation plays a major role. As consumers use WoM as an "impression management tool", they prefer talking about matters that enhance their social currency [14,16]. Speaking about a reputable university may be such a topic, as it signals their membership to an "elite group". Therefore, students of reputable universities speak more about their universities, compared to students studying at universities with a lower prestige [17,18]. Consequently, establishing a favorable reputation among current students helps attracting future students and should therefore be a key goal of a university.

Previous literature on reputation mainly investigates firms [e.g. 7]. In this context, reputation is defined as an attitudinal construct [19], which reflects the "overall evaluation" [20] of a firm. It consists both of an emotional and a cognitive component [21]. The cognitive component, the perceived firm's competence, reflects whether "stakeholders are confident about a firm's capabilities and reliability and consider it a top competitor that performs at a premium level in its market" [7] (p. 946). The emotional component indicates the "firms' character", and therefore whether it feels right to interact with the firm. This aspect of reputation is denoted as likeability [7]. This understanding of reputation can be transferred to the higher education context. Even though the basic goal functions of universities and firms differ – as firms mainly strive for profits [22] whereas universities are looking for research/teaching excellence [23] – their market approach is the same. Both organizations operate in a competitive environment, where they have to shape their stakeholders' attitudes in order to trigger positive behaviors towards the organization - i.e. sales conversion for firms/ good students' applications for universities [24]. As students' attitudes towards their universities have a cognitive and an affective component [18], university reputation can similarly be understood as a bi-dimensional attitudinal construct [25].

Whereas the reputational understanding per se is similar, the antecedents of reputation are distinct for universities. According to the social expectations approach [26], reputation formation depends on individual expectations towards an organization – and these are different concerning firms and non-profit organizations, such as universities [27], so that reputation drivers are distinct. Further, the different stakeholder groups have diverse expectations towards an organization. Therefore, in line with previous research on university reputation [e.g. 28], the present research adopts a stakeholder-specific view and thus only focuses on students' perceptions of their own university.

With respect to this stakeholder group, prior studies found the main drivers of university reputation to be the expected placement success and educational quality [9,24]. Other factors such as research performance [29], student quality in terms of selectivity [e.g. 10], fairness [30], and social life [24] were also found to have an influence on reputational assessments of students.

However, one important aspect has so far been neglected in this research field: the reputational influence of a university's digital advancement. In line with Joseph, Mullen, and Spake [31] who stated that students today "seek a modern experience that includes the latest technology", Henderson et al. [32] have shown that digital technology has become an essential part of students' academic life. But whereas prior literature confirms that digital technologies have become central for students, no literature investigates the nature of students' perceptions of their university's digital advancement, nor is the reputational impact of that factor measured.

Digital advancement might shape a university's reputation by putting the university into a more innovative light. Innovativeness in turn has been shown to be a reputational driver for corporate firms [e.g. 33,34]. Schwalbach [35] even outlines that innovational capabilities are one of the main drivers of reputation. Various established reputation measurement models include a measure of the innovativeness of firms' products or services as a driver variable [e.g. 33,36]. In the same way, Sarstedt & Schloderer [27] include innovativeness in their reputation measurement model for non-profit organizations. Vidaver-Cohen [37] even considers innovation as a potential reputational driver in the business school context. She thereby refers to the innovativeness of the school curriculum, the teaching methods as well as the schools' capability to quickly adapt to change. These study results highlight the relevance of further research on the influence of digital advancement on university reputation.

Given the unexplored nature of the topic, the different aspects of students' perceptions of their university's digital advancement need to be explored before considering the general impact of the phenomenon. Indeed, neither a definition of the construct nor an established scale exists in the literature. In order to deduce managerial implications from this study, a scale relating to the

different areas in which a university might be digitally advanced is particularly helpful. The management of a university can then decide in which way it is beneficial to be more digitally advanced. Hence a first step of this study is to answer the following research question: *How to measure students' perception of their university's digital advancement? (Study 1)*
After having built an appropriate measurement for this construct, this paper focuses on a second research question: W*hat is the relative importance of perceived digital advancement compared to other drivers of university reputation? (Study 2)*

3. Development of a measurement for perceived digital advancement (PDA)–study 1

3.1 Construct definition

This study defines perceived digital advancement (PDA) as students' general perceptions about the stage of development of their university regarding the use and integration of new technologies to support its main educational and institutional management functions (e.g. teaching, support to students, virtual learning, online communications about the university, etc.). That is to say that the PDA construct does not objectively measure the stage of digitalization of a university in comparison with a potential benchmark but rather focuses on students' own subjective evaluations. Given the fast changing nature of information technologies, such a specification avoids a future obsolescence of the construct as a measurement of universities 'actual digital advancement would only be valid for a short period of time. Rather, the PDA construct is based on students' assessment of the digital advancement of selected areas of their universities. These areas are considered separately as they form students' overall perception of their universities' digital assessment. Their identification and selection stem from the qualitative study.

3.2 Model development

In line with recent developments in the literature on measurement development [38,39] the PDA construct is defined as a hierarchical model of a reflective-formative type. That is, the different aspects of a university's digital advancement are all measured reflectively (lower-order constructs). Then, these latent constructs are in turn modeled as a formative measurement for the PDA construct (higher-order construct). The PDA measurement is developed following a mixed-method approach. First, the focus is set on content validity by means of a three-stage qualitative inquiry. The identification of the drivers of the PDA construct as well as the measurement of these drivers is obtained from a) a literature research in the field of educational research with a focus on new technological developments, b) three focus-group interviews with eighteen students from three different German institutions[1] and c) two interviews with experts on measurement development. First, we systematically reviewed the publications of the last 10 years in ten journals of the field of educational research. 40 articles dealing with digital technologies in higher education could be identified (see appendix 1). In line with the study of Henderson et al. [11], our categorization also highlights "blended learning solutions" and "student logistics" as two of the areas subjected to digital change. In addition, a third dimension could be found – "online communication and advertising". As these domains only represent the changes explored by research in higher education they might not exhaustively reflect all the domains of students' life affected by IT developments. Thus, these first results were completed by three focus group discussions with students and two expert interviews. The dimensions "blended learning solutions", and "online communications/advertising" could be confirmed. Further, due to its high heterogeneity, the dimension "student logistics" was divided into three dimensions: "connected administration and services", "virtual community engagement" and "IT facilities". All those three aspects refer to digital technologies easing the daily "work" of being a student. Hence, PDA is operationalized with the five sub-dimensions: "blended learning solutions","online communications/advertising", "virtual community engagement", "connected administration and services" and "IT facilities". The first dimension, "blended learning solutions", refers to students' perceptions regarding their university's use and integration of information technologies in educational practice (e.g. e-learning tools, podcasts, online exam preparation tools or online courses). Second, "online advertising/communication" deals with universities' internet advertising and communication (e.g. the appearance on the university homepage and online campaigns). Third, "virtual community engagement" deals with universities' use of digital technologies to build an online community with their students (e.g. the use of existing social media platforms or university-specific online networks and forums). Fourth, the construct "connected administration and services" alludes to students' global assessment of the digitalization of universities' services/administrative

[1] See http://www.en.imm.bwl.uni-muenchen.de/files/hicss.pdf for more details on the focus groups and expert interview sample and methodology.

processes (e.g. online course management, online library, mobile services or online application). Finally, "IT facilities" refers to universities' offers for students in terms of hardware and study-related software.

The five aforementioned constructs are all measured reflectively based on a set of four identical questions, adapted from Stock and Zacharias [40]'s measurement for "product program newness". Namely, the students were asked to assess each of the five PDA dimensions separately. For each dimension they had to evaluate whether they perceived it as being: "new", "progressive", „standing out positively from the offerings of other universities" and "unique", indicating for each aspect whether they agree or disagree on a seven point scale[2].

3.3 Model validation

The validity and reliability of the resulting set of 20 items (4 items x 5 dimensions) to measure PDA is tested by means of a quantitative study. In addition to these items and the measurement of "university's general technological sophistication (UGTS)" (our target construct for the criterion analysis), the online survey also comprises a measurement of students' assessment of their university's reputation [25] and their related WoM behavior [17] as well as a measurement of the most relevant drivers for university reputation: educational quality (adapted from [25,41]), research performance (adapted from [42]), students' selectivity (adapted from [41], fairness (adapted from [43], or the perceived chances on the job market (adapted from [25,37]). We included a measurement of city attractiveness (single-item) to consider social life opportunities surrounding the university life. This variable is understood as a control variable as it might influence WoM without being necessarily related to university managers' activities. Finally, the questionnaire also included demographic questions and information on respondents' university, field of study, applied degree and number of semesters completed.

A sample[3] of 655 students was recruited using convenience and snowball sampling through various mailing lists. Among the 655 collected questionnaires, a total of 564 data sets were fully completed. The data set comprises 397 female and 167 male students. All respondents were between 17 and 36 years old, with a mean age of 21.06 years old (SD: 2.693). The participants studied diverse curricula with 21 German universities being represented in the sample. Regarding the field of study, although a majority of the respondents reported studying law/economics and social studies (38.1%), eight other fields of study were part of the sample.

The PDA model is estimated using a two-way approach, also called sequential latent variable approach [38,39,44]. More precisely, in a first stage (I), the repeated indicator approach is used to a) assess the validity of the reflective measurement for the lower-order constructs (LOCs) and b) to obtain the latent variable scores (LVS) for the five LOCs. In a second stage (II), the five LVS serve as manifest variables for the higher-order construct (HOC). This measurement model is related to the UGTS construct in order to control for criterion validity. Partial least square structural equation modelling (PLS-SEM) method [38,39,45] is employed to assess the two models. Results for the first stage (I) reveal that all evaluation criteria (see appendix 2) have been met, providing support for the LOCs' measurement reliability and validity [46]. Similarly, the assessment of the quality of the formative measurement (II) of the PDA (HOC level) confirms its quality and reliability as it highlights the absolute and relative importance of each of the five dimensions of the PDA construct (see appendix 3). Finally, criterion validity is met with a R^2 value of .51 and a Q^2 value (Stone-Geisser criterion) of .353 for the model linking the PDA to the UGTS, which reveals the predictive relevance of the constructed measurement.

4. General model for university reputation and WoM behavior - study 2

As the previous results highlight the validity of the PDA measurement (following Becker's [38] guidelines on the assessment of reflective-formative measurements), the construct is integrated in a larger model to test its impact on universities' reputation and students' WoM behavior using the same dataset (see appendix 4). As for study 1, the PLS-SEM method using the SmartPLS 3.2. software application [47] was employed.

The assessment of the reflective and formative measures in the model highlights their quality and reliability as all model evaluation criteria (following [46]) have been met, leading to no indicator deletion (see appendix 5 and 6). Further, the general model for university reputation and WoM shows a good model fit (with a SRMR value of .057). As shown in appendix 4, the reported R^2 value of .406 for the likeability construct, .495 for the competence construct and .599 for the WoM

[2] Example: If you think about the IT Facilities at your university, how would you evaluate your university according to the following aspects: New/ Progressive/ Stands out positively from the offerings of other universities/ Unique

[3] See webappendix http://www.en.imm.bwl.uni-muenchen.de/files/hicss2.pdf for further information

construct shows a medium level of predictive accuracy for these endogenous constructs. With a Q^2 value of .298 for competence, .279 for likeability and .516 for the WoM construct, the results indicate a medium predictive relevance of the path model for the reputational constructs and a high predictive relevance for the WoM construct (see [46] p.178 for recommendations on Q^2's interpretation). Finally, the structural model shows no collinearity issues (with a highest VIF value of 2.148 for a predictor construct).

The analysis of the drivers in the model (see appendix 7) highlights a difference between the two components of university reputation. This dissimilarity is first observable through the diverging strength of the drivers of the competence and the likeability constructs. Indeed, although both constructs are primarily driven by students' perceptions of the educational quality of their university, the impact of the other exogenous variables in the model strongly differ among the two variables. While fairness and PDA are the next most important aspects explaining likeability, competence is mostly driven by students' estimated success on the job market and the perceived selectivity of the university. Second, this contrast between the two constructs is also visible through the assessment of the two constructs' effect on students' reported WoM behavior. With a path coefficient of .688 compared to .145, the influence of the likeability construct on WoM is much larger than the one of the competence construct. Further, the results support Schwaiger's [33] interpretation of reputation as a bi-dimensional construct including an affective and a cognitive component.

Finally, an analysis of the total effects (TE) substantiates the results of the path relationships, as the educational quality (.253), followed by perceived fairness (.172), perceived digital advancement (.137) and the perceived future success on the job market (.054) are all significantly impacting students' WoM behavior towards their university. Results also show the influence of city attractiveness (TE= .094) on WoM behavior.

5. Discussion and conclusion

The results for the general model highlight the importance of universities' digital advancement for students. The comparative analysis of the path coefficients and total effects (see appendix 7) reveals that PDA is the third most important driver for WoM behavior of a university's students (TE of .137). This results from the fact that universities with a perceived higher degree of digital advancement appear to be more likeable. Likeability in turn was found to be primarily responsible for the WoM behavior of a university's students – a result that is in line with prior research [18]. However, an effect of PDA on competence could not be confirmed.

At first sight it seems to be surprising that PDA influences likeability, but not competence. In this regard it is helpful to have a deeper look at the different areas in which a university can be digitally advanced and how it may impact students' study experience. The focus group discussions outlined that participants' assessment of universities' online advertising and communications was primarily influenced by universities' websites. For current students, such websites are also information tools, for example providing information about admission requirements or class schedules [e.g. 48]. Hence, a digitally advanced website often offers better structured information regarding a university's course offerings or study organization matters – thereby helping students to organize their studies. Further, connected administration and services mainly aim to ease students' daily life. Immatriculation issues or exam registration can be more efficiently managed using digital services. In addition, blended learning solutions offer students the possibility to experience multiple learning methods [e.g. 49]. Finally, by creating platforms for collaboration, universities' virtual community engagement reinforces the connection between students and university staff. Social media networks (e.g. Facebook) also provide additional support to students as they are often used as an information tool, for example to tell students about matters concerning their curriculum or helping them to manage their team work projects [50]. To summarize, being digitally advanced rather improves the "learning support environment" of a university than its "core learning offering" [51]. The latter is however primarily responsible for a university's competence perception, as competence of a university primarily relates to performance in education and research [23]. A high performance in education is achieved if the university "produces" students, that have the required knowledge and skills for their future jobs [37]. Consequently, a digital learning environment might mainly be perceived as support for students to succeed in their study program, but not as being actually necessary for them to be adequately educated. Yet we acknowledge that in fact digital technologies – especially blended learning solutions – might indeed lead to a better teaching quality and might thereby enhance the actual competence of a university in educating students. However, to explain university reputation, it matters to understand students' perceptions and not the actual benefits of these developments [52]. The fact that students may perceive universities' digital offers mainly as an extra support could explain that PDA affects likeability and not competence.

The hierarchical structure of the PDA construct also allows to deepen the analysis to consider the impact of its five PDA drivers on the WoM construct. The impact-

performance matrix analysis (IPMA) presented in appendix 8 extends the results of the PLS-SEM outcomes to consider the performance of the respective PDA indicators. The resulting performance of each of the five first-order constructs allows to draw a priority map for universities to improve their PDA. Effects that are relatively important (stronger total effects), and yet relatively low in performance indicate priority fields for universities' digital development. As a result, the IPMA shows that all the dimensions of digital advancement scored relatively poorly on the performance axis. These results highlight room for improvement for the German universities in our sample. More particularly, a comparison of the relative results of the five dimensions reveals that universities should first pay a particular attention to the amelioration of the connected administration/services for students as well as to the online advertising/communication of the university on the internet. These results are in line with the study of Henderson and Finger [32] which shows the importance for students of being offered digital technologies for organizing and managing the logistics of their study. For example, university managers may implement a single IT system/platform that supports students with all their administrative matters, such as their immatriculation, exam registration, class application or the provision of study materials. Further, the marketing department of the university should ensure that the university has a professional online appearance and meets the last standards in terms of website ergonomics. The improvement of universities' blended learning solutions and of their engagement in virtual communities and social networks could be considered as secondary objectives, as the two dimensions showed a less important role on students' WoM behavior. Finally, the non-significant impact of IT Facilities, which may be interpreted as a consequence of the generalization of students' private technological equipment, could reveal that the mere access to software and hardware is no longer perceived as a sign of advancement but rather as a hygiene factor for students.

This inquiry is a first step to understand the importance of PDA on universities reputation. As results highlight the relevance of the topic, it opens the way for more research on PDA. Further research projects may include a non-convenient sample in order to get a similar number of students per university in the sample. Other geographic zones could also be considered to see if these results can be replicated. The importance of other variables such as the field of study could also be explored as a potential moderator for the relationship between PDA and university reputation. Finally, the general model could also be adapted to include other stakeholder groups such as recruiters or alumni.

6. References

[1] OECD. Higher Education to 2030. 2009;2:13–6.

[2] Statista. Entwicklung der Bachelor-, Master- und übrigen Studiengänge in Deutschland [Internet]. 2016 [cited 2016 Apr 15]. Available from: http://de.statista.com.emedien.ub.uni-muenchen.de/statistik/daten/studie/2847/umfrage/entwicklung-der-bachelor--master--und-uebrigen-studiengaenge/

[3] Obermeit K. Students' Choice of Universities in Germany: Structure, Factors and Information Sources Used. Journal of Marketing for Higher Education. 2012;22(October 2013):206–230.

[4] Simões C, Soares AM. Applying to Higher Education: Information Sources and Choice Factors. Studies in Higher Education. 2010;35(4):371–389.

[5] Shahid H. What Factors Affect a Student 's Choice of a University for Higher Education. Research on Humanities and Social Sciences. 2012;2(10):64–67.

[6] Sung M, Yang S-U. Student–University Relationships and Reputation: a Study of the Links between Key Factors Fostering Students' Supportive al Intentions Towards their University. Higher Education. 2009 Oct 16;57(6):787–811.

[7] Raithel S, Schwaiger M. The Effects of Corporate Reputation Perceptions of the General Public on Shareholder Value. Strategic Management Journal. 2015;36(6):945–956.

[8] Albers S. What Drives Publication Productivity in German Business Faculties? Schmalenbach Business Review. 2015;67(1):6–34.

[9] Helgesen Ø, Nesset E. Images, Satisfaction and Antecedents: Drivers of Student Loyalty? A Case Study of a Norwegian University College. Corporate Reputation Review. 2007;10(1):38–59.

[10] Conard MJ, Conard M. An Analysis of Academic Reputation as Perceived by Consumers of Higher Education. Journal of Marketing for Higher Education. 2000;9:69–80.

[11] Henderson M, Selwyn N, Aston R. What Works and Why? Student Perceptions of "Useful" Digital Technology in University Teaching and Learning. Studies in Higher Education. 2015;(February 2015):1–13.

[12] Westbrook RA. Product / Consumption-Based Affective Responses and Postpurchase Processes. Journal of Marketing Research. 1987;24(3):258–270.

[13] Murray KB. A Test of Services Marketing Theory: Consumer Information Acquisition Activities. Journal of Marketing. 1991;55(January):10–25.

[14] Berger J. Word of Mouth and Interpersonal Communication: A Review and Directions for Future Research. Journal of Consumer Psychology. 2014;24(4):586–607.

[15] East R, Hammond K, Lomax W. Measuring the Impact of Positive and Negative Word of Mouth on Brand Purchase Probability. International Journal of Research in Marketing. 2008;25(3):215–224.

[16] Hughes M. Buzzmarketing. New York: Penguin; 2005.

[17] Arnett DB, German SD, Hunt SD. The Identity Salience Model of Relationship Marketing Success: The Case of Nonprofit Marketing. Journal of Marketing. 2003;67(2):89-105.

[18] Alwi SF, Kitchen PJ. Projecting Corporate Brand Image and al Response in Business Schools: Cognitive or Affective Brand Attributes? Journal of Business Research. 2014;67(11):2324–2336.

[19] Van Overwalle F, Siebler F. A Connectionist Model of Attitude Formation and Change. Personality and Social Psychology Review. 2005;9(3):231–274.
[20] Gotsi D, Wilson AM. Corporate Reputation: Seeking a Definition. Corporate Communications: An International Journal. 2001;6(1):24–30.
[21] Hall R. The Strategic Analysis of Intangible Resources. Strategic Management Journal. 1992;13(March 1991):135–144.
[22] March JG, Sutton RI. Organizational Performance as a Dependent Variable. Organization Science. 1997;8(6):698-706.
[23] Porter SR, Toutkoushian RK. Institutional Research Productivity and the Connection to Average Student Quality and Overall Reputation. Economics of Education Review. 2006;25(6):605–617.
[24] Duarte PO, Alves HB, Raposo MB. Understanding University Image: a Structural Equation Model Approach. International Review on Public and Nonprofit Marketing. 2010;7(1):21–36.
[25] Kindlein K. Universities as Service Providers: Managing Expectations, Satisfactions, and Loyalty in Higher Education - A Marketing Approach -. LMU; 2012.
[26] Berens G, Riel CBM Van. Corporate Associations in the Academic Literature : Three Main Streams of Thought in the Reputation Measurement Literature. Corporate Reputation Review. 2004;7(2):161–178.
[27] Sarstedt M, Schloderer M. Developing a Measurement Approach for Reputation of Non-Profit Organizations. International Journal of Nonprofit and Voluntary Sector Marketing. 2010;15:276–299.
[28] Cornelissen J, Thorpe R. Measuring a Business School's Reputation: Perspectives, Problems and Prospects. European Management Journal. 2002;20(2):172–178.
[29] Mitra D, Golder PN. Does Academic Research Help or Hurt MBA Programs? Journal of Marketing. 2008;72(September):31–49.
[30] Radulova V, Schwaiger M. Same Same but Different – A Comparative Investigation into Students' Justice Perceptions and their Impact in an Academic Setting. Proceedings of the 77th „Jahrestagung des Verbands der Hochschullehrer für Betriebswirtschaft". Vienna, Austria; 2015. p. 83.
[31] Joseph M, Mullen E, Spake D. University Branding: Understanding Students' Choice of an Educational Institution. Journal of Brand Management. 2012;20(1):1-12.
[32] Henderson M, Selwyn N, Finger G, Aston R. Students' Everyday Engagement with Digital Technology in University: Exploring Patterns of Use and "Usefulness." Journal of Higher Education Policy and Management. 2015;37(3):308-319.
[33] Schwaiger M. Components and Parameters of Corporate Reputation – an Empirical Study. Schmalenbach business review. 2004;56(January):46–71.
[34] Obrimah OA. How Important is Innovation for Venture Capitalists' (VCs') Market Reputation? Quarterly Review of Economics and Finance. Board of Trustees of the University of Illinois; 2014;61:64–76.
[35] Schwalbach J. Image, Reputation und Unternehmenswert. Information und Kommunikation in Europa. 2000;285–297.
[36] Walsh G, Beatty SE. Customer-based Corporate Reputation of a Service Firm: Scale Development and Validation. Journal of the Academy of Marketing Science. 2007;35(1):127–143.
[37] Vidaver-Cohen D. Reputation Beyond the Rankings: A Conceptual Framework for Business School Research. Corporate Reputation Review. 2007;10(4):278–304.
[38] Becker JM, Klein K, Wetzels M. Hierarchical Latent Variable Models in PLS-SEM: Guidelines for Using Reflective-Formative Type Models. Long Range Planning. 2012;45(5–6):359–394.
[39] Wetzels M, Odekerken-Schröder G, van Oppen C. Using PLS Path Modeling for Assessing Hierarchical Construct Models: Guidelines and Empirical Illustration. MIS quarterly. 2009;33(1):177–195.
[40] Stock RM, Zacharias NA. Two Sides of the Same Coin: How Do Different Dimensions of Product Program Innovativeness Affect Customer Loyalty? Journal of Product Innovation Management. 2013;30(3):516–532.
[41] Arpan LM, Raney AA, Zivnuska S. A Cognitive Approach to Understanding University Image. Corporate Communications: An International Journal. 2003;8(2):97–113.
[42] Kazoleas D, Kim Y, Moffitt MA. Institutional Image: a Case Study. Corporate Communications: An International Journal. 2001;6:205–216.
[43] Kessel F. Selected Contributions on Stakeholder Perceptions. LMU; 2013.
[44] Ringle CM, Sarstedt M, Straub D. A Critical Look at the Use of PLS-SEM in MIS Quarterly. MIS Quarterly (MISQ). 2012;36(1):iii–xiv.
[45] Lohmöller J-B. Latent Variable Path Modeling with Partial Least Squares. Heidelberg, Germany: Physica; 1989.
[46] Hair JFJ, Hult G, Ringle C, Sarstedt M. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Thousand Oaks: SAGE; 2014.
[47] Ringle CM, Wende S, Becker J-M. SmartPLS 3. Boenningstedt: SmartPLS GmbH, http://www.smartpls.com.; 2015.
[48] Will EM, Callison C. Web Presence of Universities: Is Higher Education Sending the Right Message Online? Public Relations Review. 2006;32(2):180–183.
[49] Waha B, Davis K. University Students' Perspective on Blended Learning. Journal of Higher Education Policy and Management. 2014;36(2):172–182.
[50] Demirbilek M. Social Media and Peer Feedback: What Do Students Really Think About Using Wiki and Facebook as Platforms for Peer Feedback? Active Learning in Higher Education. 2015;16(3):211–224.
[51] Plewa C, Ho J, Conduit J, Karpen IO. Reputation in Higher Education: A Fuzzy Set Analysis of Resource Configurations. Journal of Business Research. 2016;69(8):3087–3095.
[52] Schwaiger M. Components and Parameters of Corporate Reputation – an Empirical Study. Schmalenbach Business Review. 2004;56(January):46–71.
[53] Addams L, Fan Y, Morgan JR. Teaching Management Principles by Integrating Video Clips to Enhance Learning. Business Education Innovation Journal. 2013;5(2):58–67.
[54] López-Pérez MV, Pérez-López MC, Rodríguez-Ariza L, Argente-Linares E. The Influence of the Use of Technology on Student Outcomes in a Blended Learning Context. Educational Technology Research and Development.

2013;61(4):625–638.
[55] Keeling KB. iTeaching: Using an iPad to Go Green While Supporting Teaching Efficiency. Business Education Innovation Journal. 2012;4(2):44–49.
[56] Badri M, Al Rashedi A, Yang G, Mohaidat J, Al Hammadi A. Students' Intention to Take Online Courses in High School: A Structural Equation Model of Causality and Determinants. Education and Information Technologies. 2016;21(2):471-497.
[57] Kuruvilla A, Norton S, Chalasani S, Gee M. Best Practices in Initiating Online Programs at Public Institutions. Business Education Innovation Journal. 2012;4(2):121–127.
[58] Peng Z. The Web-enhanced Instruction Mode: Evidence of Undergraduate Finance Graduates with Embedded Online Assessments. Business Education Innovation Journal. 2011;3(2):82–92.
[59] Myyry L, Joutsenvirta T. Open-Book, Open-Web Online Examinations: Developing Examination Practices to Support University Students' Learning and Self-Efficacy. Active Learning in Higher Education. 2015;16(2):119–132.
[60] Nkhoma M, Cong HP, Au B, Lam T, Richardson J, Smith R, El-Den J. Facebook as a Tool for Learning Purposes: Analysis of the Determinants Leading to Improved Students' Learning. Active Learning in Higher Education. 2015;16(2):87–101.
[61] Prestridge S. A Focus on Students' Use of Twitter - Their Interactions with Each Other, Content and Interface. Active Learning in Higher Education. 2014;15(2):101–115.
[62] Lynam L, Missouri C. Course-Specific Online Demonstrations Add Layer of Richness to Instruction. 2009;I(I):16–22.
[63] Fuangvut T, Hasan H. A Campus Portal Development Methodology to Match Stakeholder Activity. ACIS 2005 Proceedings. 2005;1.
[64] Duarte PO. The Use of a Group Blog to Actively Support Learning Activities. Active Learning in Higher Education. 2015;16(2):103–117.
[65] Linvill DL, Rowlett JT, Kolind MM. Academic Pinstitution: Higher Education's Use of Pinterest for Relationship Marketing. Journal of Relationship Marketing. 2015;14(4):287–300.
[66] Fagerstrom A, Ghinea G. Co-Creation of Value in Higher Education: Using Social Network Marketing in the Recruitment of Students. Journal of Higher Education Policy and Management. 2013;35(1):45–53.

APPENDIX

Appendix 1. Aspects of digital advancement found in prior studies

Dimensions	Illustrative aspects of digital advancement	Study examples
Student Learning	Technology use (e.g. videos, tablets) in combination with classical teaching	[53–55]
	Online Courses	[56,57]
	Technological learning support (e.g. online quizzes, tools for students' learning/self-efficacy)	[58,59]
Student Logistics	Social media as a feedback tool	[50]
	Facebook as a tool for out-of-class communication/ organization	[60,61]
	Online web tools for study support/collaboration	[62]
	Campus portal for study organization	[63]
Online Communication and Advertising	Blogs as a promotional tool for universities	[64]
	Pinterest use for relationship marketing	[65]
	Social network recruitment campaign for students	[66]
	University websites	[48]

* Studies published in Journal of Higher Education Policy & Management; Journal Of Marketing For Higher Education; Business Education Innovation Journal; Higher Education Quarterly; Innovative Higher Education; Research in Higher Education; Education and Information Technologies; International Review of Education; Educational Technology Research and Development; Technology, Knowledge and Learning; Journal of Computing in Higher Education; Journal of Computers in Education; Studies in higher education; Journal of Higher Education Policy and management; Active Learning in Higher Education; Academy of Educational Leadership Journal; PACIS Proceedings; AMCIS Proceedings; SAIS Proceedings; ACIS Proceedings; ECIS Proceedings; Distance Education; Journal of Relationship Marketing

Appendix 2. PDA measurement validation - LOCs - Reflective measurement assessment

Construct	Items	Loading	C.R.[1]	Cronbachs α	AVE	D.V.[2]?
LOC1: Blended Learning Solutions	… new	0.896***	0.925	0.891	0.755	Yes
	… progressive	0.898***				
	… stands out positively from the offerings of other univ.	0.878***				
	… unique	0.800***				
LOC2: Virtual Community Engagement	… new	0.917***	0.942	0.917	0.802	Yes
	… progressive	0.911***				
	… stands out positively from the offerings of other univ.	0.908***				
	… unique	0.845***				
	… new	0.906***	0.936	0.908	0.785	Yes
	… progressive	0.906***				

LOC3: Connected Administration &Services	… stands out positively from the offerings of other univ. … unique	0.897*** 0.833***				
LOC4: Online Advertising /Communication	… new … progressive … stands out positively from the offerings of other univ. … unique	0.895*** 0.914*** 0.877*** 0.840***	0.933	0.904	0.778	Yes
LOC5: IT Facilities	… new … progressive … stands out positively from the offerings of other univ. … unique	0.909*** 0.913*** 0.905*** 0.867***	0.942	0.921	0.808	Yes

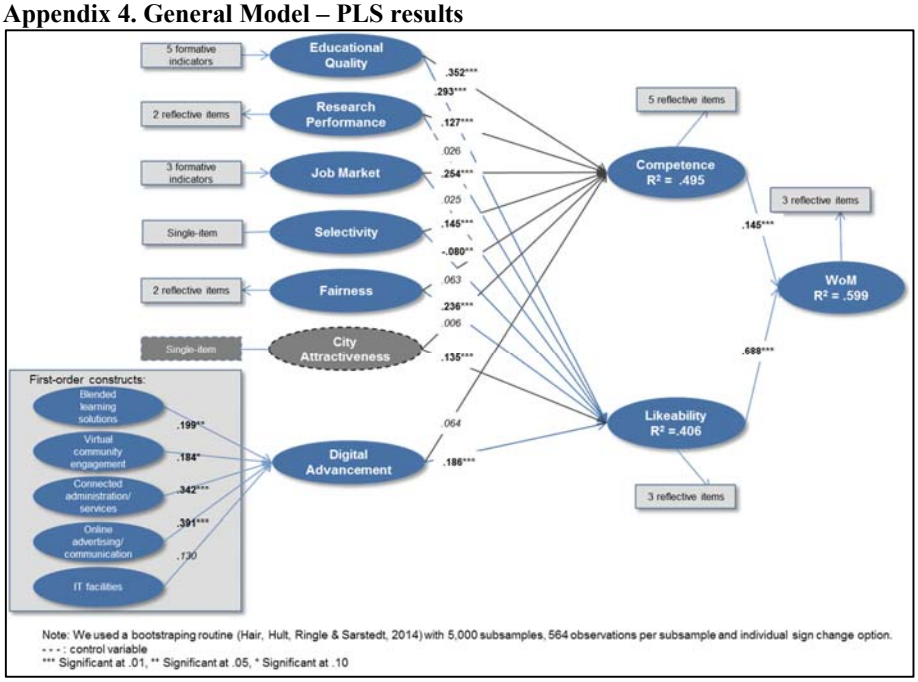
Significance level: P < 0.1; * P < 0.05; ** P < 0.01; *** P < 0.001. [1]C.R.:Composite Reliability, [2]D.R.: Discriminant Validity

Appendix 3. PDA measurement validation - HOC- Formative measurement assessment

Indicator	VIF	Outer weights	Outer loadings	Significance level
Blended Learning Solutions	1.931	0.422	0.866	***
Virtual Community Engagement	1.812	0.109	0.706	
Connected Administration &Services	1.798	0.146	0.730	**
Online Advertising /Communication	1.812	0.124	0.717	*
IT Facilities	1.748	0.424	0.854	***

Significance level: P < 0.1; * P < 0.05; ** P < 0.01; *** P < 0.001.

Appendix 4. General Model – PLS results



Appendix 5. General Model – Reflective measurement assessment

Construct	Item	Loading	C.R.[1]	Cronbachs α	AVE	D.V.[2]?
Competence	My university stands out positively from other universities.	0.822	0.891	0.850	0.621	Yes
	I am confident that my university achieves outstanding performance.	0.832				
	As far as I can see, my university is internationally recognized.	0.711				
	My university ranks among the TOP universities in Germany.	0.785				
	My university offers a promising education.	0.784				
	I regard my university as a likeable university	0.854				Yes

Likeability	My university is a university that I can better identify with than other universities.	0.890	0.885	0.805	0.720	
	My university is a university I would more regret not having if it no longer existed than I would other universities / business schools	0.799				
Word-of-mouth	I "talk up" about my university to people I know.	0.900	0.951	0.923	0.867	Yes
	I bring up my university in a positive way in conversations I have with friends and acquaintances.	0.947				
	In social situations, I often speak favorably about my university.	0.945				
Research Performance	The research at my university is of outstanding quality	0.925	0.904	0.789	0.825	Yes
	My university is renown worldwide for the quality of its research.	0.891				
Fairness	Overall I am treated fairly by my university	0.945	0.943	0.878	0.891	Yes
	For the most part, my university treats its students fairly	0.943				

Significance level: P < 0.1; * P < 0.05; ** P < 0.01; *** P < 0.001. [1]Composite Reliability, [2]Discriminant validity

Appendix 6. General Model – Formative measurement assessment

Con-struct	Items	VIF	Outer weights	Outer loadings	Sig. level
Educat. Quality	My university has outstanding professors	2.020	0.094	0.748	NS
	My university has an outstanding academic curriculum	1.859	0.473	0.872	***
	My university has highly qualified personnel	1.911	0.345	0.830	***
	My university stands out for the quality of its counseling regarding the study course	2.059	0.153	0.687	**
	My university stands out for the quality of the support provided by the lecturers	1.921	0.188	0.669	**
Job Market	Studying at my university gives me a good prospect of a rapid access into the job market	2.741	0.334	0.896	**
	Studying at my university gives me a good prospect of a starting salary above average	2.464	0.440	0.898	***
	My university has a strong network with the business world	1.605	0.376	0.813	***
PDA	Blended Learning Solutions	1.931	0.199	0.782	*
	Virtual Community Engagement	1.812	0.184	0.821	*
	Connected Administration &Services	1.798	0.342	0.719	***
	Online Advertising /Communication	1.812	0.391	0.846	***
	IT Facilities	1.748	0.130	0.761	NS

Significance level: P < 0.1; * P < 0.05; ** P < 0.01; *** P < 0.001.

Appendix 7. General model – Structural model assessment

	Likeability		**Competence**		**WoM**	
	Path Coefficients	**f^2 Effect Size**	**Path Coefficients**	**f^2 Effect Size**	***Total Effects* & Path Coefficients**	**f^2 Effect Size**
PDA	0.186***	0.044	0.064 (NS)	0.006	*0.137****	
Educational quality	0.293***	0.067	0.352***	0.114	*0.253****	
Research performance	0.026 (NS)	0.001	0.127***	0.028	*0.036(NS)*	
Job market	0.025(NS)	0.001	0.254***	0.092	*0.054**	
Selectivity	-0.080**	0.010	0.145***	0.036	*-0.034(NS)*	
Fairness	0.236***	0.054	0.063 (NS)	0.005	*0.172****	
City attractiveness	0.135***	0.029	0.006 (NS)	0.000	*0.094****	
Competence					0.145***	0.038
Likeability					0.688***	0.861

Significance level: P < 0.1; * P < 0.05; ** P < 0.01; *** P < 0.001.

Appendix 8. Impact-performance map